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1. $P(A|B) = \frac{P(A \cap B)}{P(B)}$

A = Ace of clubs
B = Black Card

$P(A|B) = \frac{1/52}{1/2} = \frac{2}{52} = \frac{1}{26}$, A

2. $52 \times 51 \times \cdots \cdots 1$

↓
Possibilities for first card

$= 52!_0$ C

3. $\sum_{x=1,2,4} \sum_{y=1,3} C_{xy} = 1$

$\sum_{x=1,2,4} (c_x + 3c_x) = 1$

$c + 2c + 4c + 3c + 6c + 12c = 1$

$c(28) = 1$

$c = \frac{1}{28}$ A

4. $f(x,y) = x^4 - 8x^2 + y^4 - 18y^2$

$\frac{df}{dx} = 4x^3 - 16x = 0$

$4x^3 - 16x = 0$

$4x^3 = 16x$

$x^2 = 4$

$x = \pm 2$

$\frac{df}{dy} = 4y^3 - 36y = 0$

$4y^3 = 36y$

$y^2 = 9$

$y = \pm 3$

Shipra

$$\frac{d^2f}{dx^2} = 12x^2 - 16$$

put $x = 2 \Rightarrow \frac{d^2f}{dx^2} > 0$, local minima

put $x = -2 \Rightarrow \frac{d^2f}{dx^2} \geq 0$, local minima

$$\frac{d^2f}{dy^2} = 12y^2 - 36$$

put $y = 3 \Rightarrow \frac{d^2f}{dy^2} > 0$, local minima

put $y = -3 \Rightarrow \frac{d^2f}{dy^2} > 0$, local minima

C

B - $B \in$ Null space if $AB = 0$

$$A = \begin{bmatrix} 2 & 3 & 1 & 4 \\ 1 & 2 & 1 & 3 \\ -1 & 0 & 1 & 1 \end{bmatrix}^T$$

$$AB = \begin{bmatrix} 2 & 3 & 1 & 4 \\ 1 & 2 & 1 & 3 \\ -1 & 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 5 \\ 1 \\ 2 \end{bmatrix} \neq 0$$

for $B = [3, -5, 1, 2]$

$AB = 0$

Hence $B = (3, -5, 1, 2)^T$

B

7. $A = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ $B = \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix}$

$A = AB^T = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \begin{bmatrix} 3 & 4 & 5 \end{bmatrix}$

$A = \begin{bmatrix} 3 & 4 & 5 \\ 6 & 8 & 10 \end{bmatrix}$

echelon form of $A = \begin{bmatrix} 1 & 4/3 & 5/3 \\ 0 & 0 & 0 \end{bmatrix}$

A has 1 ~~linearly~~ independent vector

So, Rank = 1

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